Section 8. Geometric Processing Subsystem

8.1 Introduction

The Geometric Processing Subsystem (GPS) processes L1R image data to produce Level-1 geometrically corrected (L1G) images.

The GPS is being developed external to the LPGS development by the AIT for IAS and LPGS. GPS is considered a black box by the LPGS implementation team.

Information presented in this section is intended to provide the LPGS development team's understanding of the GPS. (For further information on the GPS design, refer to the IAS GPS Detailed Design Specification.)

8.2 Design Overview

This section provides an overview of the GPS software design. The relationship between the GPS and other LPGS subsystems is presented, along with a discussion of the assumptions, constraints, and considerations used in the design process.

8.2.1 Subsystem Software Overview

Figure 8–1 contains the context diagram of the GPS.

The GPS interfaces with the PCS, and LPGS system files. The GPS receives processing parameters (Proc_Parms) from the PCS and returns processing status (Proc_Status) to PCS. The GPS writes completed L1G image data to the Image_Processing_Files. The GPS Image_Processing_Files are accessed by the QAS for quality assessment and AAS for error analysis.

The GPS performs geometric correction on L1R images. L1G processing removes the sensor-, satellite-, and Earth-induced distortions from the raw imagery. L1G transforms the raw imagery into a map projection. The L1G process follows the L1R correction processing. Sensor distortions are caused by misalignment of the forward and reverse scans, the nonlinear motion of the scan mirror, the misalignment of the spectral bands, and the apparent misalignment of the individual detectors on the focal plane. Satellite distortions result from gyro drift, ephemeris data not in range, and variations in spacecraft attitude. Earth distortions result from the Earth's shape and rotation distortion and terrain elevation.

8.2.2 Design Considerations

The GPS is being developed initially for, and under the direction of, the IAS project by the AIT.

Figure 8–1. GPS Context Diagram

8.2.2.1 Design Assumptions

The following assumptions were made in reusing the GPS:

- The GPS will seamlessly integrate into the LPGS.
- The GPS will include all geometric processing functionality required by the LPGS.
- Each LPGS work order will have a unique directory that contains three subdirectories: the input, intermediate, and output. GPS will be able to access these directories.
- Thresholds for the LPGS ingest process will be configurable by the operator. The GPS will be capable of accessing these user inputs.
- The GPS will be able to meet LPGS processing performance requirements for production of the L1G images.
- The GPS will meet LPGS processing volume requirements for the production of the L1G images.
- The LPGS system engineers monitor the development of the GPS to ensure that the LPGS's requirements are being met; especially where they differ from the IAS requirements. Differences between the LPGS and IAS requirements for GPS are minor.